

L 28001-66

ACC NR: AP6012496

served bands and of the temperature dependences of the intensities of the individual components with the published data leads to the conclusion that the observed effect is an optic analog of the Mossbauer effect in five different recombinations centers of silicon. Each band has a narrow line adjacent to a long-wave branch with a well-pronounced maximum. The narrow lines are due to phononless radiative transitions within the centers, and the long-wave components are due to radiative transitions with emission of acoustic phonons. The appearance of new bands during annealing is evidence of the complex nature of the centers. The authors thank P. S. Solov'yev for help with the preparation for the experiment. Orig. art. has: 1 figure and 1 table.

[02]

SUB CODE: 20/

SUBM DATE: 04Oct65/

ORIG REF: 004/

OTH REF: 001/ ATD PRESS

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Card 2/2 CC

L 40352-66 EWT(m)/EWF(t)/ETI IJP(c) GG/JD

ACC NR: AP6019223

SOURCE CODE: UR/0250/66/010/002/0080/0082

AUTHOR: Sevchenko, A. N.; Tkachev, V. D.

ORG: Belorussian State University im. V. I. Lenin (Belorusskiy gosudarstvennyy universitet)

TITLE: Photoconductivity spectra of p-type silicon irradiated with fast electrons

SOURCE: AN BSSR. Doklady, v. 10, no. 2, 1966, 80-82

TOPIC TAGS: photoconductivity, silicon, impurity center, irradiation effect, irradiation damage, Fermi level

ABSTRACT: The object of the work was to study the kinetics of formation and stability of radiation damage in p-type silicon irradiated with 1 MeV electrons at 25-30°C and integral doses of 10^{13} - 10^{18} electrons/cm². The change in the shape of the spectra of impurity photoconductivity was studied as a function of the irradiation dose. The effectiveness of the formation of radiation damage was found to depend on the impurity composition of the crystals. The shape of the spectrum of the photoconductivity signal depends on the position of the Fermi level in the forbidden zone. By raising or lowering the Fermi level, one can eliminate certain centers from the photoconductivity processes, which confirms the authors' earlier hypothesis that the structure of the spectra is related to volume defects, since the change in the position of the Fermi level reflects the conditions in the volume of the crystal. The observed change in the spec-

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tra following the cessation of irradiation is attributed not only to different stabil-
ities of the radiation defects, but also to the occurrence of redistribution of point
radiation defects among the various impurity atoms. In conclusion, the authors express
their sincere appreciation to V. S. Vavilov for discussing the work and his many useful
comments. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 14Jun65/ ORIG REF: 005

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L 27360-66 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6011529

SOURCE CODE: UR/0250/66/010/003/0148/0150

AUTHORS: Sevchenko, A. N.; Tkachev, V. D.; Lugakov, P. F.;
Yukhnovich, A. V.

ORG: Belorussian State University im. V. I. Lenin (Belorusskiy gosudarstvennyy universitet)

TITLE: Investigation of the influence of heat treatment on the photoelectric properties of silicon with radiation damages in its structure

SOURCE: AN BSSR. Doklady, v. 10, no. 3, 1966, 148-150

TOPIC TAGS: silicon, single crystal, crystal structure, radiation damage, photoelectric property, heat effect, photoconductivity, fine structure, crystal defect

ABSTRACT: The purpose of the investigation was to study the temperature stability of different radiation damages which are produced in single crystal silicon when irradiated with energy particles. The initial material was p-type silicon with resistivity 7 -- 10 ohm-cm, containing $3 \text{ -- } 8 \times 10^{17} \text{ cm}^{-3}$ oxygen. The irradiation was with 1-Mev electrons from an electrostatic generator at 80K and 30C. The spectral dependence of the stationary photoconductivity was plotted with apparatus described by

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A. F. Plotnikov et al. (PTE, no. 3, 183, 1962). The results show that samples whose photoconductivity spectrum displayed no structure shortly after the cessation of the irradiation, acquired a pronounced structure after prolonged storage at liquid-nitrogen temperature. This is attributed to diffusion of the vacancy pairs resulting from the electron bombardment. An increase in the temperature and longer storage following the bombardment causes the point defects due to the bombardment to become annealed. The results are interpreted and reconciled with the level scheme of the defects. A quantitative interpretation of the phenomenon is made difficult by the presence of different types of structure defects which can become transformed into each other during annealing. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 14Jun65/ ORIG REF: 004/

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L 34820-60 ENT(1)/ENT(m)/T/ENT(1)/ENT(1) SOURCE CODE: UR/0250/66/010/006/0374/0376
ACC NR: AP6021921

AUTHOR: Sevchenko, A. N.; Stel'makh, V. F.; Tkachev, V. D.

ORG: Belorussian State University im. V. I. Lenin (Belorusskiy gosudarstvennyy universitet)

TITLE: Photoelectric properties of gallium arsenide containing structure defects due to radiation

SOURCE: AN BSSR. Doklady, v. 10, no. 6, 374-376

TOPIC TAGS: gallium arsenide, radiation effect, photoresistance, photoconductivity, resistivity, photoelectric property, fast neutron, neutron irradiation

ABSTRACT: The energy spectrum of local levels in n- and p-type gallium arsenide single crystals irradiated with fast neutrons ⁹ was investigated by studying the structure of photoconductivity spectra beyond the absorption edge. Spectral dependencies of photoconductivity were recorded at temperatures of 300 and 80K using samples with a resistivity up to 10^{12} ohm. The specific resistivity of the irradiated samples was found to depend markedly on the density of neutron beams: at fluxes of 10^{14} neutrons/cm² the resistivity increased slowly; at higher densities it increased rapidly, showing a tendency toward saturation at 10^{17} neutrons/cm². It was concluded that the irradiation of gallium arsenide produces a great number of stable combinations of point defects and residual chemical impurities. Orig. art. has: 2 figures. [ZL]
SUB CODE: 20/ SUBM DATE: 09Mar66/ ORIG REF: 002/ OTH REF: 002/ ATD PRESS: 573/
Card 1/1

L 42097-66 EWT(m)/T/ENP(t)/ETI IJP(c) JD

ACC NR: AP6029648

SOURCE CODE: UR/0250/66/010/008/0550/0552

AUTHOR: Sevchenko, A. N.; Tkachev, V. D.; Urenev, V. I.

ORG: Belorussian State University im. V. I. Lenin (Belorusskiy gosudarstvennyy universitet)

TITLE: Photoconductivity spectra of germanium single crystals irradiated with gamma-quanta

SOURCE: AN BSSR. Doklady, v. 10, no. 8, 1966, 550-552

TOPIC TAGS: germanium single crystal, gamma irradiation, electron energy level, impurity level

ABSTRACT: An investigation was made of the system of energy levels which appears in n-type and p-type germanium irradiated with gamma-quanta from Co^{60} at room temperature. Particular attention was given to a study of the stable centers which introduce deep energy levels into the forbidden zone. Photoconductivity spectra were taken in a range from 1 to 5 μ for temperatures from 300 to 80K before and after irradiation with integrated fluxes of 10^{14} — 5×10^{17} kv/cm². The specimens used were n- and p-type germanium single crystals with initial specific resistances of 48 ohm·cm and 6 ohm·cm, respectively. The concentration of residual impurities in the electrically active state for n-type

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material was up to 10^{12} — 10^{13} cm^{-3} . Investigation of the electrical characteristics of specimens after irradiation showed the presence of $E_v + 0.01$ ev, $E_v + 0.008$ ev, and $E_v + 0.17$ ev levels in p-type germanium and $E_c - 0.20$ ev level in n-type germanium. Irradiation of n-type crystals with doses up to 5×10^{17} kv/cm² did not change the conductivity sign. At $T = 80\text{K}$ the Fermi level in irradiated n-type specimens was located 0.16—0.22 ev from the bottom of the conductivity zone, while in p-type specimens it was found 0.20—0.26 ev from the top of the valence zone. The presence of deep centers in both irradiated and nonirradiated crystals indicates that these centers are not generated due to the irradiation but are only displayed as the result of it. The transition of electrons between the zones and these centers in irradiated crystals can lead to a significant change in the concentration of free carriers. Such a change in concentration is possible since after irradiation the equilibrated concentration of free carriers becomes very low as a result of their capture by the radiation damage, which introduces shallower energy levels. Therefore in irradiated specimens for which the ratio $\Delta\sigma/\sigma$ is greater, it is possible to detect deep energy levels which belong to residual imperfections of the crystal lattice. Orig. art. has: 1 figure. [JA]

SUB CODE: 20/ SUBM DATE: 15Apr66/ ORIG REF: 002/ OTH REF: 002

ATD PRESS: 5064

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ACC NR: AP6033157

SOURCE CODE: UR/0250/66/010/009/0641/0643

AUTHOR: Sevchenko, A. N. (Academician AN BSSR); Lomako, V. M.; Tkachev, V. D.

ORG: Belorussian State University im. V. I. Lenin (Belorusskiy gosudarstvennyy universitet)

TITLE: Temperature and optical quenching of radiative recombination of gallium arsenide

SOURCE: AN BSSR. Doklady, v. 10, no. 9, 1966, 641-643

TOPIC TAGS: gallium arsenide, luminescence quenching, radiative recombination, temperature dependence, absorption band, Raman spectrum

ABSTRACT: The purpose of the investigation was to determine the influence of temperature on the spectral distribution of the radiative recombination of electroluminescent diodes obtained from n-type GaAs by diffusion of beryllium, and the influence of constant external illumination in the intrinsic absorption band ($\lambda < 0.83$ nm) on the intensity of the recombination band. The carrier density in the initial GaAs was $8 \times 10^{17} - 6 \times 10^{18} \text{ cm}^{-3}$. The optical resonators were made from the crystal by cleavage. The Raman spectra were investigated with apparatus based on the IKS-12 spectrometer. The radiation receiver was a germanium photodiode or a cooled PbS photoresistance. The constant illumination was with the aid of an incandescent lamp and a number of filters. The tests were made at temperatures 80 - 30K in a cryostat evacuated to 10^{-4} mm Hg. The radiative recombination without additional illumination

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had three peaks, at 1.02, 1.26, and 1.44 ev. Additional illumination reduced greatly the 1.26 ev peak and both shifted and attenuated the two other bands. The radiative recombination also decreased with increasing temperature. The results are related to the formation of effective centers for electron adhesion. The authors thank M. T. Lappo and V. S. Veliyev for help with the experiments. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 21May66/ ORIG REF: 004/ OTH REF: 001

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1. 09/17-67 EWT(m)/EWP(L)/EPI JJP(c) JD
ACC NR: AP6027951

SOURCE CODE: UR/0020/66/169/003/0562/0564

AUTHOR: Sevchenko, A. N. (Academician AN BSSR); Tkachev, V. D.; Lugazov, P. F. 4/-

ORG: Belorussian State University im. V. I. Lenin (Belorusskiy gosudarstvennyy universitet)

TITLE: Energy spectrum of radiation damage in silicon single crystals 27 16

SOURCE: AN SSSR. Doklady, v. 169, no. 3, 1966, 562-564

TOPIC TAGS: silicon semiconductor, semiconductor band structure, crystal lattice defect, irradiation damage, impurity level

ABSTRACT: The purpose of the investigation was to determine the energy levels that appear when the crystal is irradiated with different integral fluxes of 1-Mev electrons ($10^{13} - 10^{18}$ el/cm²), fast reactor neutrons ($10^{12} - 10^{19}$ neut/cm²), and γ quanta from Co⁶⁰ ($10^{15} - 10^{19}$ qu/cm²). The initial n- and p-type crystals had a resistivity 0.03 -- 150 ohm-cm and a low concentration of impurities capable of producing deep levels in the forbidden band. The investigation consisted of measuring the temperature dependence of the conductivity and of the Hall coefficient, and the spectral distribution of the photoconductivity signal. The electrical measurements identified the principal donor and acceptor centers, while the photoelectric measurements identified the levels due to point defects and some of the chemical impurities. The results

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show that the point defects give an almost continuous set of local levels near the conduction and valence band, this being due to the varied separation of the vacancy - interstitial atom pairs. A complete energy-level scheme of radiation-damaged silicon is presented. Orig. art. has: 3 figures.

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ACC NR: AP6036960

(A,N)

SOURCE CODE: UR/0181/66/008/011/3213/3217

AUTHOR: Yukhnevich, A. V.; Tkachev, V. D.; Bortnik, M. V.

ORG: Belorussian State University im. V. I. Lenin, Minsk (Belorusskiy gosudarstvennyy universitet)

TITLE: Annealing of bands of impurity recombination radiation in silicon irradiated with gamma quanta

SOURCE: Fizika tverdogo tela, v. 8, no. 11, 1966, 3213-3217

TOPIC TAGS: recombination radiation, radiative recombination, semiconductor carrier, gamma irradiation

ABSTRACT: The isochronous annealing of infrared radiation bands arising in silicon from the radiative recombination of excess carriers across the levels of radiation defects was studied. In the 25-600°C range, the successive appearance and disappearance of various bands was observed, indicating a complex character of the rearrangement of defects during annealing. The results obtained show an important role of oxygen in the formation of recombination centers in silicon upon irradiation with gamma quanta. On the other hand, this recombination radiation is a good indicator of low oxygen concentrations, and can be used to determine the latter. Thus, recombination radiation can be used as a means of studying the radiation defects of silicon and processes of their rearrangement during heat treatment. Nine different "radiating" radiation defects were observed, and the kinetics of their annealing showed the struc-

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ture of stable radiation defects to be complex. Oxygen atoms are an integral part of most of the radiation defects responsible for the observed bands of impurity recombination radiation. Phosphorus atoms participate in the formation of centers radiating D and E bands, and boron atoms take part in the formation of centers radiating F and I₃ bands. The majority recombination centers (determining the lifetime of excess carriers) are annealed at 400-500°C. They are also linked to oxygen and are centers of nonradiative recombination. The intensity and energy distribution of the various bands of recombination radiation of silicon containing radiation defects and subjected to heat treatment permit an analysis of the content of chemical impurities in the initial single crystals. Both active (boron, phosphorus) and inactive impurities (oxygen) can thus be analyzed. Authors thank Z. M. Afanas'yev and P. S. Solov'yev for their systematic assistance in the course of the experiments. Orig. art. has: 1 figure and 1 table.

SUB CODE: 20/ SUBM DATE: 21Mar66/ ORIG REF: 006/ OTH REF: 008

Card 2/2

TKACHEV, V.F.

New theorem on k -twins, an analog to Wilson's theorem for primes.
Usp. mat. nauk 20 no. 1: 74-75 -Pg 165.

(MIRA 18:8)

TKACHEV, V.F. (Moskva); TKACHEV, VI.F. (Voronezh)

Criteria for the absence of arbitrary and multiple limit cycles.
Mat. sbor. 52 no. 3:811-822 N '60. (MIRA 13:12)
(Differential equations)

~~TKACHOV, V. F.~~

New sufficient conditions for stability, semistability and instability of the limit cycle of the $\frac{dy}{dx} = \frac{p(x,y)}{q(x,y)}$ equation. Dokl. AN SSSR 116 no. 4:564-567 0 '57. (MIRA 11:3)

1. Voronezhskiy gosudarstvennyy universitet. Predstavleno akademikom P. S. Aleksandrovym.

(Differential equations)

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S/039/60/052/003/003/007

C 111/ C 333

AUTHORS: Tkachev, V. F. (Moscow), Tkachev, Vl. F. (Voronezh)

TITLE: On Criteria for the Absence of Arbitrary and Multiple Limit Cycles

PERIODICAL: Matematicheskiy sbornik, 1960, Vol.52, No.3, pp.811-822

TEXT: The author considers the system

$$(1) \quad \frac{dx}{dt} = P(x,y), \quad \frac{dy}{dt} = Q(x,y).$$

General theorem (Theorem 1): Let the system (1) be given in a simply connected domain G; let P and Q be continuous. If there are functions N(x,y), M(x,y) continuous in G, the partial derivatives of which are continuous in G and which possess the property that for the functions

$$h(x,y) = PM + QN \text{ and } k(x,y) = \frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \text{ in } G \text{ there holds one of}$$

the following systems of signs

$$[\geq 0; \equiv 0], [\leq 0; \equiv 0]; [\equiv 0; \geq 0]; [\equiv 0; \leq 0]; [\geq 0; \leq 0]$$

or $[\leq 0; \geq 0]$, then (1) possesses no limit cycles in G (the signs ≤ 0)


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and ≥ 0 mean that the function is $= 0$ at most on single curves and
otherwise < 0 or > 0).

Under the additional assumptions that $P(x,y)$, $Q(x,y)$ are continuous and
continuously differentiable in G and that (wherever it is necessary)
 $N(x,y)$, $M(x,y)$ are twice continuously differentiable, the author
collects in a scheme the most essential conditions (doubly framed)
under which (1) possesses no limit cycles in G . Criteria based on
the inverse signs ($\square \geq 0; \leq 0$), ($\square \leq 0; \geq 0$) of the functions
 $h(x,y)$ and $k(x,y)$ must be used in the Green formula with regard to the
sign.



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Scheme

	$h(x,y)$	$M(x,y)$ $N(x,y)$ $F(x,y) > 0$	$k(x,y)$	Remarks
	$FPM + FQN \geq 0$ ≤ 0 $\equiv 0$		$\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \leq \equiv 0$ $\geq \equiv 0$ $\leq \equiv 0$	General criterion
1	M and N such that $h > 0$ everywhere in G			
a	$F^2(P^2+Q^2) > 0$	$M = FP$ $N = FQ$	$\frac{\partial FQ}{\partial x} - \frac{\partial FP}{\partial y} \leq \equiv 0$	
b	$F^2(P^2+Q^2)^2 > 0$	$M = F(P+Q)$ $N = F(P+Q)$	$\frac{\partial F(P+Q)}{\partial x} - \frac{\partial F(P+Q)}{\partial y} \leq \equiv 0$	
c	$F^2(P-Q)^2 > 0$	$M = F(P-Q)$ $N = F(Q-P)$	$\frac{\partial F(P-Q)}{\partial x} - \frac{\partial F(P-Q)}{\partial y} \leq \equiv 0$	

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d	$F^2(P^2+Q^2) > 0$	$M = F(P+KQ)$ $N = F(-KP+Q)$	$\frac{\partial F(Q-KP)}{\partial x} - \frac{\partial F(P+KQ)}{\partial y} \leq \neq 0$	$K(x,y)$ arbitrary function
e	$F^2(P^2+Q^2) > 0$	$M = F(P-KQ)$ $N = F(Q+KP)$	$\frac{\partial F(Q+KP)}{\partial x} - \frac{\partial F(P-KQ)}{\partial y} \leq \neq 0$	Criteria which generalize those of Bendixon-Dulac
2	M and N such that $h \equiv 0$ everywhere in G			
a	$FF'(PQ-PQ) \equiv 0$	$M = -QF'$ $N = PF'$	$\frac{\partial F'P}{\partial x} + \frac{\partial F'Q}{\partial y} \leq \geq 0$	Criterion of Dulac
b	$F(PQ-PQ) \equiv 0$	$F' = 1$	$\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} \leq \geq 0$	Criterion of Bendixon

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3	M and N such that $k \equiv 0$ everywhere in G			
a	$FP \frac{\partial K}{\partial x} + FQ \frac{\partial K}{\partial y} \leq \geq 0$	$M = \frac{\partial K}{\partial x}$ $N = \frac{\partial K}{\partial y}$	$\frac{\partial^2 K}{\partial x \partial y} - \frac{\partial^2 K}{\partial x \partial y} \equiv 0$	Criterion of the type of H. Poincare
b	$P \frac{\partial K}{\partial x} + Q \frac{\partial K}{\partial y} \leq \geq 0$	$F = 1$	$\frac{\partial^2 K}{\partial x \partial y} - \frac{\partial^2 K}{\partial x \partial y} \equiv 0$	Somewhat generalized Poincare Criterion
4	M and N such that $k \geq 0$ everywhere in G			
a	$F(P \frac{\partial K}{\partial x} + QN) \leq 0$ $N - \frac{\partial K}{\partial y}$ a monotone increasing function in x	$M = \frac{\partial F}{\partial x}$	$\frac{\partial M}{\partial x} - \frac{\partial^2 K}{\partial x \partial y} =$ $\frac{\partial}{\partial x} (M - \frac{\partial K}{\partial y}) \geq 0$	

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5	Other cases			
a	$2PQK \begin{matrix} \leq 0 \\ \geq 0 \\ = 0 \end{matrix}$	$M = FKQ$ $N = FKP$	$\frac{\partial CP}{\partial x} - \frac{\partial CQ}{\partial y} \begin{matrix} \leq 0 \\ = 0 \\ \geq 0 \end{matrix}$	C = FK
b	$P^2 - Q^2 \begin{matrix} \leq 0 \\ \geq 0 \end{matrix}$	$M = PF$ $N = QF$	$-\frac{\partial FQ}{\partial x} + \frac{\partial FP}{\partial y} \begin{matrix} \leq 0 \\ = 0 \\ \geq 0 \end{matrix}$	

A cycle C is denoted as multiple limit cycle if for it

$$\int_0^l \left(\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} \right) dt \quad \text{vanishes, where } l \text{ is the length of}$$

C and the integration is carried out along the limit cycle in the direction of increasing t.

Theorem 2: Let $P(x,y)$, $Q(x,y)$ in (1) be continuous functions with

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On Criteria for the Absence of Arbitrary and Multiple Limit Cycles

continuous partial derivatives in a simply connected domain G . If there are functions $N(x,y) > 0$, $M(x,y)$ continuous and continuously differentiable in G such that it is everywhere in G

$$h = \frac{\partial NP}{\partial x} + \frac{\partial NQ}{\partial y} + \frac{\partial M}{\partial x} NP + \frac{\partial M}{\partial y} NQ \geq 0 \quad (\leq 0)$$

and that h vanishes identically in no partial domain of G , then in G there are no multiple limit cycles of (!).

In theorem 3 the author gives four further criteria for the absence of multiple limit cycles. A generalized form of the first of these criteria is given in

theorem 3*: Let $P(x,y)$, $Q(x,y)$ be twice continuously differentiable in the simply connected domain G . Let twice continuously differentiable functions $N(x,y) > 0$ and $M(x,y)$ exist such that

1.) the curves $N(x,y) P(x,y) = 0$ and $N(x,y) Q(x,y) = 0$ are representable as monotone functions $y = f(x)$ and $x = \varphi(y)$;

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2.) the expressions $A = \frac{\partial}{\partial x} \left(\frac{\partial NQ}{\partial y} \frac{1}{NQ} + \frac{\partial M}{\partial y} \right)$ and

$$B = - \frac{\partial}{\partial y} \left(\frac{\partial NP}{\partial x} \frac{1}{NP} + \frac{\partial M}{\partial x} \right)$$

are of constant and equal sign and both expressions do not simultaneously vanish identically;

3.) the signs of A and $\frac{\partial NQ}{\partial y} \frac{1}{NQ} + \frac{\partial M}{\partial y}$ (or of B and $\frac{\partial NP}{\partial x} \frac{1}{NP} + \frac{\partial M}{\partial x}$) are in a sufficiently small neighborhood of the curve $x = \varphi(y)$ ($y = f(x)$) identical in the lower (upper) part of the plane under (above) the curve or, however,

$$\frac{\partial NQ}{\partial y} \frac{1}{NQ} + \frac{\partial M}{\partial y} \text{ and } \frac{\partial NP}{\partial x} \frac{1}{NP} + \frac{\partial M}{\partial x}$$

vanish identically, while in the other parts of the curves $x = \varphi(y)$ or $y = f(x)$ these expressions have equal signs opposite to

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the sign of A or vanish identically.

Then (1) possesses no multiple limit cycles in G.

There are 3 figures. and 6 references: 3 Soviet, 2 French and 1 American.

SUBMITTED: March 6, 1959

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20-4-11/51

AUTHOR: TKACHEV, V.F.
 TITLE: TKACHEV, V.F.

On New Sufficient Conditions for the Stability, Semistability
 and Instability of the Limit Cycle of the Equation $\frac{dy}{dx} = \frac{P(x,y)}{Q(x,y)}$
 (O novykh dostatochnykh usloviyakh ustoychivosti, polunustoychivosti
 i neustoychivosti predel'nogo tsikla uravneniya $\frac{dy}{dx} = \frac{P(x,y)}{Q(x,y)}$)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 166, Nr. 4, pp. 564-567 (USSR)

ABSTRACT: Given the differential equation

$$(1) \quad \frac{dy}{dx} = f(x,y),$$

where $f(x,y) = \frac{P(x,y)}{Q(x,y)}$ and $P(x,y)$ and $Q(x,y)$ have partial

derivatives of sufficiently high order. Let further $L: x = \varphi(s),$
 $y = \psi(s)$ ($0 \leq s \leq 1$) be a closed integral curve of (1). Then,
 according to Papush [Ref. 1], in a sufficiently small neighborhood
 of L (1) can be replaced by the equation

$$(2) \quad \frac{dn}{ds} = F(s,n), \quad F(s,n) = \frac{\psi'(s) - n\varphi''(s) - f\varphi'(s) - nf\psi''(s)}{\varphi' + f\psi'}$$

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On New Sufficient Conditions for the Stability, Semistability
and Instability of the Limit Cycle of the Equation $\frac{dy}{dx} = \frac{P(x,y)}{Q(x,y)}$

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where s is the arc length and n is the length of the normal.
Theorem: The following conditions are sufficient for

1. stability (instability) of the cycle:

$$\int_0^1 F'_n(s, n) ds \Big|_{n=0} = 0,$$

$$\int_0^1 F''_n \exp \left[\int_0^s F'_n dt \right] ds \Big|_{n=0} = 0, \dots, \int_0^1 F_n^{(k-1)} \left\{ \exp \left[\int_0^s F'_n dt \right] \right\}^{k-2} ds \Big|_{n=0} = 0,$$

$$\int_0^1 F_n^{(k)} \left\{ \exp \left[\int_0^s F'_n dt \right] \right\}^{k-1} ds \Big|_{n=0} < 0 \quad (0 > 0) \quad k - \text{odd},$$

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2. semistability:

On New Sufficient Conditions for the Stability, Semistability
and Instability of the Limit Cycle of the Equation $\frac{dy}{dx} = \frac{P(x,y)}{Q(x,y)}$

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$$\int_0^1 F'_n(s,n) ds \Big|_{n=0} = 0, \quad \int_0^1 F_n^{(j)} \left\{ \exp \left[\int_0^s F'_n dt \right] \right\}^{j-1} ds \Big|_{n=0} = 0$$

$$\int_0^1 F_n^{(k)} \left\{ \exp \left[\int_0^s F'_n dt \right] \right\}^{k-1} ds \Big|_{n=0} \neq 0 \quad \begin{matrix} j=2,3,\dots,k-1 \\ k - \text{even.} \end{matrix}$$

ASSOCIATION: Voronezh State University (Voronezhskiy gosudarstvennyy universitet)
PRESENTED BY: P. S. Aleksandrov, Academician, April 27, 1957
SUBMITTED: April 18, 1957
AVAILABLE: Library of Congress

Card 3/3

TKACHEV, V.F. (Moskva)

Necessary and sufficient conditions of stability, semistability,
and instability of a limited cycle and some of their applications.
Mat.sbor. 56 no.3:281-300 Mr '62. (MIRA 15:4)
(Stability) (Vibration)

TRACHEV, V.F.

Generalization of L. Poincaré's theorem on the lack of limit
cycles, and some other results. *Usp. mat. nauk* 16 no.5:207-
207 S-O 161. (MIRA 14:10)

(Differential equations)

CHIGIRINETS, A.A.; TKACHEV, V.F.

Multiple machining of supports. Mashinostroitel' no. 4:30 Ap '61.
(Milling machines) (MIRA 14:4)

TKACHEV, V.F. (Moskva); TKACHEV, Vl.F. (Voronezh)

Criteria for the absence of arbitrary and multiple limit cycles.
Mat. sbor. 52 no. 3:811-822 N '60. (MIRA 13:12)
(Differential equations)

85226

16.3400

S/039/60/052/003/003/007

C 111/ C 333

AUTHORS: Tkachev, V. F. (Moscow), Tkachev, Vl. F. (Voronezh)

TITLE: On Criteria for the Absence of Arbitrary and Multiple Limit Cycles

PERIODICAL: Matematicheskiy sbornik, 1960, Vol.52, No.3, pp.811-822

TEXT: The author considers the system

$$(1) \quad \frac{dx}{dt} = P(x,y), \quad \frac{dy}{dt} = Q(x,y).$$

General theorem (Theorem 1): Let the system (1) be given in a simply connected domain G; let P and Q be continuous. If there are functions N(x,y), M(x,y) continuous in G, the partial derivatives of which are continuous in G and which possess the property that for the functions

$$h(x,y) = PM + QN \text{ and } k(x,y) = \frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \text{ in } G \text{ there holds one of}$$

the following systems of signs

$$[\geq 0; \equiv 0], [\leq 0; \equiv 0]; [\equiv 0; \geq 0]; [\equiv 0; \leq 0]; [\geq 0; \leq 0]$$

or $[\leq 0; \geq 0]$, then (1) possesses no limit cycles in G (the signs ≤ 0)


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On Criteria for the Absence of Arbitrary and Multiple Limit Cycles
and ≥ 0 mean that the function is $= 0$ at most on single curves and
otherwise < 0 or > 0).

Under the additional assumptions that $P(x,y)$, $Q(x,y)$ are continuous and
continuously differentiable in G and that (wherever it is necessary)
 $N(x,y)$, $M(x,y)$ are twice continuously differentiable, the author
collects in a scheme the most essential conditions (doubly framed)
under which (1) possesses no limit cycles in G . Criteria based on
the inverse signs ($[\geq 0; \leq 0]$, $[\leq 0; \geq 0]$) of the functions
 $h(x,y)$ and $k(x,y)$ must be used in the Green formula with regard to the
sign.



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On Criteria for the Absence of Arbitrary and Multiple Limit Cycles

Scheme

	$h(x,y)$	$M(x,y)$ $N(x,y)$ $F(x,y) > 0$	$k(x,y)$	Remarks
	$FPM + FQN \geq 0$ ≤ 0 $\equiv 0$		$\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \geq \equiv 0$ $\leq \equiv 0$	General criterion
1	M and N such that $h > 0$ everywhere in G			
a	$F^2(P^2+Q^2) > 0$	$M = FP$ $N = FQ$	$\frac{\partial FQ}{\partial x} - \frac{\partial FP}{\partial y} \leq \equiv 0$	
b	$F^2(P^2+Q^2)^2 > 0$	$M = F(P+Q)$ $N = F(P+Q)$	$\frac{\partial F(P+Q)}{\partial x} - \frac{\partial F(P+Q)}{\partial y} \leq \equiv 0$	
c	$F^2(P-Q)^2 > 0$	$M = F(P-Q)$ $N = F(Q-P)$	$\frac{\partial F(P-Q)}{\partial x} - \frac{\partial F(P-Q)}{\partial y} \leq \equiv 0$	

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d	$F^2(P^2+Q^2) > 0$	$M = F(P+KQ)$ $N = F(-KP+Q)$	$\frac{\partial F(Q-KP)}{\partial x} - \frac{\partial F(P+KQ)}{\partial y} \leq 0$	$K(x,y)$ arbitrary function
e	$F^2(P^2+Q^2) > 0$	$M = F(P-KQ)$ $N = F(Q+KP)$	$\frac{\partial F(Q+KP)}{\partial x} - \frac{\partial F(P-KQ)}{\partial y} \leq 0$	Criteria which generalize those of Bendixon-Dulac
2	M and N such that $h \equiv 0$ everywhere in G			
a	$FF'(PQ-PQ) \equiv 0$	$M = -QF'$ $N = PF'$	$\frac{\partial F'P}{\partial x} + \frac{\partial F'Q}{\partial y} \leq \geq 0$	Criterion of Dulac
b	$F(PQ-PQ) \equiv 0$	$F' = 1$	$\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} \leq \geq 0$	Criterion of Bendixon

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On Criteria for the Absence of Arbitrary and Multiple Limit Cycles

3	M and N such that $k \equiv 0$ everywhere in G			
a	$FP \frac{\partial K}{\partial x} + FQ \frac{\partial K}{\partial y} \leq \geq 0$	$M = \frac{\partial K}{\partial x}$ $N = \frac{\partial K}{\partial y}$	$\frac{\partial^2 K}{\partial x \partial y} - \frac{\partial^2 K}{\partial x \partial y} \equiv 0$	Criterion of the type of H. Poincare
b	$P \frac{\partial K}{\partial x} + Q \frac{\partial K}{\partial y} \leq \geq 0$	$F = 1$	$\frac{\partial^2 K}{\partial x \partial y} - \frac{\partial^2 K}{\partial x \partial y} \equiv 0$	Somewhat generalized Poincare Criterion
4	M and N such that $k \geq 0$ everywhere in G			
a	$F(P \frac{\partial K}{\partial x} + QN) \equiv \leq 0$ $N - \frac{\partial K}{\partial y}$ a monotone increasing function in x	$M = \frac{\partial F}{\partial x}$	$\frac{\partial M}{\partial x} - \frac{\partial^2 K}{\partial x \partial y} =$ $\frac{\partial}{\partial x} (M - \frac{\partial K}{\partial y}) \geq 0$	

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On Criteria for the Absence of Arbitrary and Multiple Limit Cycles

5	Other cases			
a	$2PQK \begin{matrix} \geq 0 \\ \leq 0 \\ = 0 \end{matrix}$	$M = FKQ$ $N = FKP$	$\frac{\partial CP}{\partial x} - \frac{\partial CQ}{\partial y} \begin{matrix} \leq 0 \\ = 0 \\ \geq 0 \end{matrix}$	C = FK
b	$P^2 - Q^2 \begin{matrix} \geq 0 \\ \leq 0 \end{matrix}$	$M = PF$ $N = QF$	$\frac{\partial FQ}{\partial x} + \frac{\partial FP}{\partial y} \begin{matrix} \leq 0 \\ = 0 \\ \geq 0 \end{matrix}$	

A cycle C is denoted as multiple limit cycle if for it

$$\int_0^l \left(\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} \right) dt \quad \text{vanishes, where } l \text{ is the length of}$$

C and the integration is carried out along the limit cycle in the direction of increasing t.

Theorem 2: Let $P(x,y)$, $Q(x,y)$ in (1) be continuous functions with

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On Criteria for the Absence of Arbitrary and Multiple Limit Cycles

continuous partial derivatives in a simply connected domain G . If there are functions $N(x,y) > 0$, $M(x,y)$ continuous and continuously differentiable in G such that it is everywhere in G

$$h = \frac{\partial NP}{\partial x} + \frac{\partial NQ}{\partial y} + \frac{\partial M}{\partial x} NP + \frac{\partial M}{\partial y} NQ \geq 0 \quad (\leq 0)$$

and that h vanishes identically in no partial domain of G , then in G there are no multiple limit cycles of (1).

In theorem 3 the author gives four further criteria for the absence of multiple limit cycles. A generalized form of the first of these criteria is given in

theorem 3*: Let $P(x,y)$, $Q(x,y)$ be twice continuously differentiable in the simply connected domain G . Let twice continuously differentiable functions $N(x,y) > 0$ and $M(x,y)$ exist such that

1.) the curves $N(x,y) P(x,y) = 0$ and $N(x,y) Q(x,y) = 0$ are representable as monotone functions $y = f(x)$ and $x = \varphi(y)$;

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2.) the expressions $A = \frac{\partial}{\partial x} \left(\frac{\partial NQ}{\partial y} \frac{1}{NQ} + \frac{\partial M}{\partial y} \right)$ and

$$B = - \frac{\partial}{\partial y} \left(\frac{\partial NP}{\partial x} \frac{1}{NP} + \frac{\partial M}{\partial x} \right)$$

are of constant and equal sign and both expressions do not simultaneously vanish identically;

3.) the signs of A and $\frac{\partial NQ}{\partial y} \frac{1}{NQ} + \frac{\partial M}{\partial y}$ (or of B and $\frac{\partial NP}{\partial x} \frac{1}{NP} + \frac{\partial M}{\partial x}$) are in a sufficiently small neighborhood of the curve $x = \varphi(y)$ ($y = f(x)$) identical in the lower (upper) part of the plane under (above) the curve or, however,

$$\frac{\partial NQ}{\partial y} \frac{1}{NQ} + \frac{\partial M}{\partial y} \text{ and } \frac{\partial NP}{\partial x} \frac{1}{NP} + \frac{\partial M}{\partial x}$$

vanish identically, while in the other parts of the curves $x = \varphi(y)$ or $y = f(x)$ these expressions have equal signs opposite to

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On Criteria for the Absence of Arbitrary and Multiple Limit Cycles

the sign of A or vanish identically.

Then (1) possesses no multiple limit cycles in G.

There are 3 figures, and 6 references: 3 Soviet, 2 French and 1 American.

SUBMITTED: March 6, 1959

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S/042/51/016/005/005/005
C111/C444

AUTHOR: Trubnikov, V. F.

TITLE: A generalization of the theorem of H. Poincaré on the absence of limit cycles and some other results

PERIODICAL: Uspekhi matematicheskikh nauk, v. 16, no. 5, 1961, 205 - 207

TEXT: A well-known theorem of Poincaré for systems of second order is generalised as follows:

Theorem 1: If in a certain domain G of the space (x_1, x_2, \dots, x_n) there exists a continuous function $N(x_1, x_2, \dots, x_n)$ with continuous partial derivatives such that

$$h(x_1, x_2, \dots, x_n) = \frac{\partial N}{\partial x_1} P_1 + \frac{\partial N}{\partial x_2} P_2 + \dots + \frac{\partial N}{\partial x_n} P_n$$

has a constant sign and does not vanish in G , then the system

$$\frac{dx_i}{dt} = P_i(x_1, x_2, \dots, x_n) \quad (i = 1, 2, \dots, n) \quad (2)$$

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C111/C444

A generalisation of the theorem...

does not possess any closed integral curves in G.
Adjoining it is proved:

Theorem 2: If the system
$$\left. \begin{aligned} \frac{d^2x}{dt^2} &= f_1(x, y) \frac{dx}{dt} + g_1(x, y) \frac{dy}{dt} + l_1(x, y), \\ \frac{d^2y}{dt^2} &= f_2(x, y) \frac{dx}{dt} + g_2(x, y) \frac{dy}{dt} + l_2(x, y) \end{aligned} \right\} \quad (4)$$

where all functions $f_i(x, y)$, $g_i(x, y)$, $l_i(x, y)$, $i = 1, 2$, are continuous and possess continuous partial derivatives, is defined in a simply connected domain G, and if there

$$h(x, y) = l_1(x, y) + l_2(x, y) > 0 \quad (< 0)$$

$$h(x, y) = \frac{\partial}{\partial x} (g_1 + g_2) - \frac{\partial}{\partial y} (f_1 + f_2) > 0 \quad (< 0),$$

then (4) does not possess any limit cycles in G.

Theorem 3: If the system
$$\left. \begin{aligned} \frac{d^2x}{dt^2} &= m_1(x, y) \frac{d^2x}{dt^2} + n_1(x, y) \frac{d^2y}{dt^2} + f_1(x, y) \frac{dx}{dt} + g_1(x, y) \frac{dy}{dt} + l_1(x, y), \\ \frac{d^2y}{dt^2} &= m_2(x, y) \frac{d^2x}{dt^2} + n_2(x, y) \frac{d^2y}{dt^2} + f_2(x, y) \frac{dx}{dt} + g_2(x, y) \frac{dy}{dt} + l_2(x, y), \end{aligned} \right\} \quad (5)$$

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S/042/61/016/005/005/005
C111/C444

A generalisation of the theorem...

where all m, n, f, g, l are continuous, possessing continuous partial derivatives, is defined in a simply connected domain G , and if there

$$\frac{\partial(m_1(x, y) + m_2(x, y))}{\partial y} + \frac{\partial(n_1(x, y) + n_2(x, y))}{\partial x} \equiv 0$$

$$\frac{\partial(m_1(x, y) + m_2(x, y))}{\partial x} < 0 \quad (> 0), \quad \frac{\partial(n_1(x, y) + n_2(x, y))}{\partial y} < 0 \quad (> 0)$$

$$h(x, y) = l_1(x, y) + l_2(x, y) > 0 \quad (< 0)$$

$$K(x, y) = \frac{\partial}{\partial x} (g_1 + g_2) - \frac{\partial}{\partial y} (f_1 + f_2) > 0 \quad (< 0),$$

then (5) does not possess any limit cycles in G .

There is one Soviet-bloc reference and one non-Soviet-bloc reference.

SUBMITTED: February 3, 1960

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MARTYNOV, I.V.; KRUGLYAK, Yu.L.; MAKAROV, S.P.; TKACHEV, V.G.

Halo- α -nitrocarboxylic acids. Part 4: Derivatives of fluoro-
chloro- α -nitropropionic acids. Zhur.ob.khim. 33 no.10:
3388-3391 0 '63. (MIRA 16:11)

L 14437-66 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b) MJW/JD
ACC NR: AP6002117 (N) SOURCE CODE: UR/0369/65/001/006/0688/0693

AUTHOR: Tkachev, V.I.; Kripyakevich, R.I.

ORG: Physicotechnical Institute, AN UkrSSR (Fiziko-tekhnicheskii institut AN UkrSSR)

TITLE: On the role of hydrogen in the processes of steel failure in neutral corrosive media

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 6, 1965, 688-693

TOPIC TAGS: hydrogen embrittlement, carbon steel, cathode polarization, mechanical fatigue, corrosion, sodium chloride

ABSTRACT: Low-cycle plastic fatigue (alternating deformation above the yield point) was studied on 08 KP steel (0.09% C, 0.37% Mn, 0.019% Si, traces of P and S) in order to determine low degrees of hydrogen absorption taking place in neutral electrolytes (3% NaCl solution). The specimens were subjected to bend tests beyond the elastic limits (plastic fatigue) at a frequency of 0.8 cps on an IMA IP-1 machine. A platinum spiral served as the anode during polarization. From the test results, "polarization curves," i.e., graphs of plastic fatigue (number of cycles up to failure) versus density of the cathodic polarization current were plotted. The curves obtained for the action of

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neutral and acid electrolytes in the presence of cathodic polarization were qualitatively similar, which constitutes an indirect confirmation of the hydrogen embrittlement of the metal in neutral electrolytes in the presence of plastic fatigue. The decrease in plastic fatigue under the influence of hydrogen at relatively low cathodic current densities is reinforced by the presence of stress concentrators produced by selective corrosion. Orig. art. has: 3 figures.

SUB CODE: 11 / SUBM DATE: 11Jun65 / ORIG REF: 013 / OTH REF: 007


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L 14415-66 EWP(z)/EWT(m)/EWP(b)/T/EWA(d)/EWP(w)/EWI(t) MJW/JD/WB
ACC NR: AP6002126 (N) SOURCE CODE: UR/0369/65/001/006/0732/0733

AUTHOR: Tkachev, V. I.; Kripyakevich, R. I.; Kuslitskiy, A. B.; Kreymerman, G. I.

ORG: Physicomechanical Institute AN UkrSSR, L'vov (Fiziko-mekhanicheskiy institut AN UkrSSR)

TITLE: Effect of the purity of steel and corrosion medium on low-cycle fatigue

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 1, no. 6, 1965, 732-733

TOPIC TAGS: steel, corrosion, durability, hydrogen embrittlement, sulfuric acid, sodium chloride, stress concentration

ABSTRACT: The effect of the content of nonmetallic inclusions on the low-cycle fatigue of annealed ShKh15 steel produced by various processes was studied in air and in corrosive media (3% NaCl solution; 0.1 N H₂SO₄ solution; 0.1 N H₂SO₄ solution with cathodic polarization at current density $D_c = 10 \text{ A/dm}^2$ corresponding to hydrogen absorption). Tests in air showed a marked divergence in the values of the durability of the purest and most contaminated steel. In the neutral medium, the durability drops by 15—25% while the effect of purity diminishes. In the acid medium, the durability drops even more (by 25—30%). Under hydrogen absorption conditions, the durability is at its minimum (about 60% of the value in air), Card 1/2

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ACC NR: AP6002126

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and its dependence on the purity is slight; this is because the formation of brittle cracks causes a decrease in durability. As the corrosiveness of the medium increases, the influence of steel purity of low-cycle fatigue levels off, probably because additional stress concentrators which are more effective than the nonmetallic inclusions are formed. During hydrogen absorption, the inclusions act as sources of cracks. Orig. art. has: 2 figures.

SUB CODE: 11 / SUBM DATE: 17Jun65 / ORIG REF: 003

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L 42319-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/WB
 ACC NR: AP6020916 SOURCE CODE: UR/0369/66/002/002/0192/0194
 44
 B

AUTHORS: Tkachev, V. I.; Kripyakevich, R. I.; Kuslitskiy, A. B.

ORG: Physico-Mechanical Institute, AN UkrSSR, L'vov (Fiziko-mekhanicheskiy institut AN UkrSSR)

TITLE: Influence of preliminary hydrogenation and corrosion on the low-cycle fatigue of steel

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 2, no. 2, 1966, 192-194
 CORROSION RATE, HYDROGENATION, LOW CARBON STEEL, CARBON STEEL,
 TOPIC TAGS: steel, alloy steel, hydrogen embrittlement, metal aging / 08kp low

carbon steel, ShKh15 carbon steel

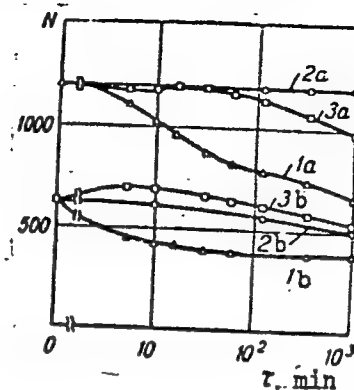
ABSTRACT: The low-cycle (plastic) fatigue of annealed low-carbon steel 08kp and of high-carbon steel ShKh15 was studied. The study extends the results of an earlier investigation by B. I. Tkachev and R. I. Kripyakevich (Fiziko-khimicheskaya mekhanika materialov, 1965, No. 6). The experimental procedure followed is described by V. I. Tkachev and Yu. I. Babey (Fiziko-khimicheskaya mekhanika materialov, 1966, No. 2). The hydrogenation and corrosion of 2.5 x 5 mm specimens was carried out in 3% NaCl at a current density of 3 amp/dm². The experimental results are presented graphically (see Fig. 1). It was found that the decrease of plastic strength due to corrosion and hydrogenation bears a different character: corrosion leads to irreversible changes, whereas changes brought about

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ACC NR: AR6020916

Fig. 1. Influence of the period, τ , of preliminary corrosion and hydrogenation on the number of cycles N for complete destruction of steel specimens O8kp (a) and ShKh15 (b) respectively. 1 - preliminary hydrogenation; 2 - same, but followed by two hours of aging at 1000; 3 - preliminary corrosion.



by hydrogenation may be reversed by hydrogen desorption. The rate and degree of strength recovery depend on the composition of the steel; carbon and alloying elements decrease the tendency towards recovery. It is suggested that plastic fatigue experiments constitute a more sensitive method for determining hydrogen than the rupture experiments. Orig. art. has: 2 graphs.

SUB CODE: 11/ SUBM DATE: 19Jan66/ ORIG REF: 004

Card 2/2 *ldh*

L 37941-66 ENT(m)/ENP(w)/I/ENP(t)/ETI IJP(c) JD

ACC NR: AP6023448

SOURCE CODE: UR/0369/66/002/003/0336/0339

AUTHOR: Kuslitskiy, A. B.; Kreymerman, G. I.; Kokotaylo, I. V.; Starovoytov, Yu. A.;
Karpenko, G. V.; Tkachev, V. I.

ORG: Physicomechanical Institute, AN UkrSSR, L'vov (Fiziko-mekhanicheskiy institut AN UkrSSR)

TITLE: Effect of metallurgical factors on the low-cycle fatigue in various media

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 2, no. 3, 1966, 336-339

TOPIC TAGS: steel, low alloy steel, nickel containing steel, vacuum-degassed steel,
~~low cycle fatigue, steel fatigue strength, steel fatigue life~~/12KhN3A steel
Steel fatigue

ABSTRACT: Low-alloy 12KhN3A structural steel, conventionally cast or vacuum degassed, was hot-rolled into 40 mm plates or 3 mm sheets, hardened and tempered to a tensile strength of 100 dan/mm², and tested for fatigue strength in the air, in a 3% NaCl aqueous solution, and in the same solution with applied cathodic polarization, the latter to promote a hydrogen absorption. A constant-amplitude, symmetrical bending at a frequency of 0.8 cps was used in the tests. The test results showed that vacuum-degassed steel had a longer fatigue life in all the investigated media than the conventionally cast steel, especially in the tests in the NaCl solution with cathodic polarization. The embrittling effect of hydrogen and, correspondingly, the difference in the fatigue life increased with increasing amplitude. Longitudinal

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L 37941-55

ACC NR: AP6023448

specimens had a longer fatigue life than that of transverse specimens. With increasing amplitude, the difference in the fatigue life of longitudinal and transverse specimens increased substantially in tests in the air, and less so in tests in NaCl solution, but noticeably decreased in the NaCl with cathodic polarization. Sheet specimens had a slightly higher fatigue life than that of plate specimens in the air and in NaCl solution, but lower in NaCl with cathodic polarization. Orig. art. has: 1 figure. [MS]

SUB CODE: 11/ SUBM DATE: 05Feb66/ ORIG REF: 002/ ATD PRESS: 5047

Card 2/2 //LP

35309

S/039/62/056/003/001/004

B125/B102

11.3400

AUTHOR: Tkachev, V. F. (Moscow)

TITLE: Necessary and sufficient conditions of stability, semi-stability, and instability of the limiting cycle and some of their applications

PERIODICAL: Matematicheskii sbornik, v. 56(98), no. 3, 1962, 281 - 300

TEXT: The author derives general criteria of stability and semi-stability of the limiting cycle L ($x=x(t) = x(t+T)$, $y = y(t) = y(t+T)$) of the system $dx/dt = P(x, y)$, $dy/dt = Q(x, y)$. A sequence h_1, h_2, \dots is constructed in terms of which the criteria are formulated: If there is an odd number k such that $h_1 = 0, h_2 = 0, \dots, h_{k-1} = 0, h_k < 0$ (> 0), then the limiting cycle L will be stable (unstable); if there is an even number k such that $h_1 = 0, h_2 = 0, \dots, h_{k-1} = 0, h_k < 0$, then the limiting cycle L will be semi-stable. The first two h read as follows:

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B125/1102

Necessary and sufficient ...

$$h_1 = \int_0^T \frac{1}{P^2 + Q^2} \left\{ P \left[(-Q) \frac{\partial}{\partial x} + P \frac{\partial}{\partial y} \right] Q - Q \left[\dots \right] P \right\} dt = \int_0^T \left(\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} \right) dt.$$

$$h_2 = \int_0^T \int_0^t \frac{1}{P^2 + Q^2} \left\{ P \left[(-Q) \frac{\partial}{\partial x} + P \frac{\partial}{\partial y} \right] Q - Q \left[\dots \right] P \right\} ds \times$$

$$\times \left(\frac{1}{2(P^2 + Q^2)^{3/2}} \left\{ P \left[(-Q) \frac{\partial}{\partial x} + P \frac{\partial}{\partial y} \right]^2 Q - Q \left[\dots \right]^2 P \right\} - \right.$$

$$- \frac{1}{(P^2 + Q^2)^2} \left\{ \left(\frac{\partial P}{\partial y} + \frac{\partial Q}{\partial x} \right) \left(P^2 \frac{\partial Q}{\partial y} - Q^2 \frac{\partial P}{\partial x} \right) + 3P^2 Q^2 \left(\frac{\partial P}{\partial y} + \frac{\partial Q}{\partial x} \right) \left(\frac{\partial P}{\partial x} - \frac{\partial Q}{\partial y} \right) + \right.$$

$$+ (PQ^2 - QP^2) \left(2 \frac{\partial P}{\partial x} \frac{\partial Q}{\partial y} + \left(\frac{\partial P}{\partial y} \right)^2 + \left(\frac{\partial Q}{\partial x} \right)^2 + 2 \frac{\partial P}{\partial y} \frac{\partial Q}{\partial x} \right) -$$

$$\left. \left. - 2PQ \left(Q^2 \left(\frac{\partial P}{\partial x} \right)^2 - P^2 \left(\frac{\partial Q}{\partial y} \right)^2 \right) \right\} \right) dt,$$

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Necessary and sufficient ...

S/039/62/056/003/001/004
B125/B102

These general criteria are specialized for so-called regular or monotonic limiting cycles. There are 15 references: 14 Soviet-bloc and 1 non-Soviet-bloc.

SUBMITTED: January 11, 1960 (initially) September 1, 1961 (after revision)

Card 3/3

L 04923-67 EWT(d)/EWT(m)/EL P.W)/FMP(t)/ETI IJP(c) EM/JD/WB

ACC NR: AP6029687

SOURCE CODE: UR/0369/66/002/004/0457/0463

AUTHOR: Tkachev, V. I. ; Kripyakevich, R. I.

ORG: Physics-Engineering Institute, AN UkrSSR, L'vov (Fiziko-mekhanicheskiy institut AN UkrSSR)

TITLE: Effect of characteristics of cyclic load on the low-cycle fatigue in media

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 2, no. 4, 1966, 457-463

TOPIC TAGS: chromium steel, cyclic load, cyclic strength, corrosive strength, hydrogenation

ABSTRACT: Effects of amplitude, frequency, and asymmetry of cyclic deformation on the service life of steel in corrosive and hydrogenating environments was studied. High tempered 2.5 mm diam specimen of 12 KhN3A steel were exposed to 3% NaCl aqueous solutions and in the same solution under cathodic polarization to 10 a/dm² current densities, and tested at 1, 10, and 100 cycles/min and 0.5-8% amplitude of total deformation, ϵ . The amplitude of deformation was shown to be the dominating factor for service life. Stress characteristics

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I. 04923-67
ACC NR: AP6029687

and alloy properties affected service life under experimental conditions much more than electrochemical conditions. At $10-10^4$ cycles to failure, $\epsilon N^m = C$, N being the number of cycles and m and C constants. The effect of environment decreases with increasing amplitude of deformation and no essential effect of corrosivity is observed if the amplitude reaches a critical value. Under uniform amplitudes of deformation and at low-cycle tests in air, service life is hardly affected by the asymmetry of cycles. Service life in a hydrogenating medium increased at the transition from asymmetry to symmetry of the cycle. Effects of environment on service life decreased with increasing frequencies of cyclic stress, particularly in hydrogenating and, to a lesser degree, in corrosive environments. The value of the critical amplitude decreases with increasing frequency. Orig. art. has: 2 formulas, 2 tables, and 4 figures.

SUB CODE: 11/ SUBM DATE: 03Mar66/ ORIG REF: 005/ OTH REF: 006

kh

Card 2/2

L 04941-6/ ENT(d)/ENT(m)/EWP(w)/EWP(t)/ETI IJP(c) EM/JD
ACC NR: AP6029688 SOURCE CODE: UR/0369/66/002/004/0464/0467

AUTHOR: Tkachev, V. I.; Kripyakevich, R. I.; Kuslitskiy, A. B.; Kreymerman, G. I.

ORG: Physics-Engineering Institute, AN UkrSSR, L'vov (Fiziko-mekhanicheskiy Institut AN UkrSSR)

TITLE: Effect of stress concentration on low-cycle fatigue in media

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 2, no. 4, 1966, 464-467

TOPIC TAGS: stress concentration, material deformation, corrosive strength, hydrogenation, cyclic strength, fatigue strength

ABSTRACT: The effect of the amplitude of total deformation, ϵ , and of stress frequency, ν , on the low-cycle fatigue of specimens was studied with concentrators of stress, represented by 1 mm holes in the flat samples. The latter were tested in air and in corrosive and in hydrogenating environments. Concentration of stress resulted in a marked decrease of service life under low-cycle fatigue as compared with conditions of uniform stress distribution. The value $N(\epsilon)$, N being the number of cycles, showed the same basic dependence upon conditions as under uniform stress. The value of critical deformation decreased at a concentration of

Card 1/2

L 04941-67

ACC NR: AP6029688

stress. The dependence of the effective coefficient of stress concentration on deformation amplitude and stress frequency was determined by the ratio of the environment factors for uniform stress and concentrated stress, respectively. Orig. art. has: 3 figures.

SUB CODE: 11/ SUBM DATE: 03Mar66/ ORIG REF: 001/ OTH REF: 011

kh

Card 2/2

TKACHUK, V.K.

Respiratory fluctuations of the ballistocardiogram in hypertension treated in a biotron. Vrach. delo no.1:25-28 Ja'64 (MIRA 17:3)

1. Kafedra terapii i kafedra nervnykh bolezney Kiyevskogo instituta usovershenstvovaniya vrachey. Nauchnyye rukovoditeli chlen-korrespondent AMN SSSR, prof. D.F. Chebotarev i zasluzhennyy deyatel' nauki prof. D.I.Panchenko.

TKACHEV, V.K., mashinist teplovoza

Diesel locomotive engineer V.K. Tkachev shares his experience.
Elek. i tepl. tiaga no.6:41-42 Je '58. (MIRA 11:6)

1. Depo Orsk, Orenburgskaya doroga.
(Diesel locomotives)

TKACHEV, V.K.

Maintenance of TE3 diesel locomotives during winter. Elek. i tepl.
tiaga 2 no.1:18-19 Ja '58. (MIRA 11:3)

1. Starshiy mashinist teplovoza TE3, depo Orsk, Orenburgskoy dorogi.
(Diesel locomotives--Cold weather operation)

ARAPOV, V.A.; TKACHEV, V.N.

Upper Paleozoic tuff lavas and ignimbrites of the Kurama Range.
Trudy Lab. vulk. no.20:199-205 '61. (MIRA 14:11)

1. Glavgeologiya Uzbekskoy SSR.
(Kurama Range--Vocanic ash, tuff, etc.)

"APPROVED FOR RELEASE: 07/16/2001

CIA-RDP86-00513R001755920016-5

APPROVED FOR RELEASE: 07/16/2001

CIA-RDP86-00513R001755920016-5"

TKACHEV, V. N., Cand Tech Sci -- (diss) "Corrosion Damage to the Metal of Locomotive Furnaces." Khar'kov, 1957. 12 pp (Min of Railways USSR, Khar'kov Inst of Engineers of Railway Transportation in S. M. Kirov), 110 copies (KL, 49-57, 113)

- 41 -

TKACHEV, V.N., kand. tekhn. nauk, dots., red.; PLECHUK, A.P., red.

[Induction hard facing with wear-resistant alloys] Induktsionnaya naplavka iznosostoikikh splavov; sbornik statei. Rostov-na-Donu, ONTI 1963. 112 p. (MIRA 17:9)

1. Rostovskiy-na-Donu nauchno-issledovatel'skiy institut tekhnologii mashinostroyeniya (for Tkachev).

KISLIK, V.A., doktor tekhn. nauk, prof.; TKACHEV, V.N., inzh.

Local corrosion of metal in steam locomotive boilers. Trudy RIIZHT
no.23:170-216 '58. (MIRA 11:6)

(Locomotive boilers—Corrosion)

TKACHEV, V.N., kand.tekhn.nauk; SHVEDIKOV, N.M., inzh.

Self-grinding cutting parts of milling cutters. Trakt. i sel'khoz mash.
31 no.12:19 D '61. (MIRA 15:1)

1. Rostovskiy nauchno-issledovatel'skiy institut tekhnologii
mashinostroyeniya.

(Peat machinery)

KISLIK, V.A., doktor tekhn.nauk, prof.; TKACHEV, V.N., kand.tekhn.nauk

"Investigating the wear of metals" by M.M.Khrushchov, M.A.Babichev.
Reviewed by V.A.Kislik, V.N.Tkachev. Vest.mash. 41 no.8:87-88
Ag '61. (MIRA 14:8)

(Mechanical wear)
(Khrushchov, M.M.) (Babichev, M.A.)

TKACHEV, V.N., kand.tekhn.nauk; SMOVT, M.S., inzh.

Built-up welding of cultivator sweeps using sormite and high-frequency currents. Trakt.i sel'khoz mash. 32 no.4:42-45 Ap '62.
(MIRA 15:4)

1. Rostovskiy-na-Donu nauchno-issledovatel'skiy institut
tekhnologii mashinostroyeniya.
(Cultivators—Maintenance and repair)

TKACHEV, V.N., kand. tekhn. nauk

Increasing the durability of machine parts. Biul. tekhn.-ekon.
inform. Gos. nauch.-issl. nauch. i tekhn. inform. 17 no.9:
22-24 S '64 (MIRA 18:1)

L 11108-66

(N)

EWI(m)/EWP(e)/EWP(v)/I/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c)

ID/HM/H

ACC NR: AP6002531

SOURCE CODE: UR/0286/65/000/023/0036/0036

INVENTOR: Petrov, S. A.; Kaufman, M. S.; Kinalyuk, P. I.; Zhuravlev, V. L.;
Krichavskiy, Z. A.; Aldyrev, D. A.; Kazintsev, N. V.; Tkachev, V. N.

27
B

ORG: none

TITLE: Method of strengthening thin-sheet parts. Class 21, No. 176646. [an-
nounced by the All-Union Scientific Research and Design Technological Institute
of Coal Machine Building (Vsesoyuznyy nauchno-issledovatel'skiy i proyektno-tekhn-
ologicheskoy institut ugol'nogo mashinostroyeniya); Rostov Scientific Research
Technological Machine Building Institute (Rostovskiy nauchno-issledovatel'skiy
institut tekhnologii mashinostroyeniya)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 23, 1965, 36

TOPIC TAGS: thin sheet part, part strengthening, part surfacing, thin sheet
surfacing, wear resistant powder

ABSTRACT: This Author Certificate introduces a method of strengthening thin-
sheet parts by surfacing with wear-resistant powder deposited with high-frequency
current. To maintain a constant gap between the inductor and the surfaced part,
ensure a small depth of penetration in the base metal, and to avoid burning
through, the inductor is located below the surfaced part. [ND]

SUB CODE: 11/ SUBM DATE: 24Nov62/ ATD PRESS: 4/76
Card 1/1 H(A) UDC: 621.791.927-415

L 04549-67 ENT(d)/ENT(m)/ENT(w)/I/ENT(t)/ETI/ENT(h)/ENT(l) INT(c) 00
 ACC NR: AP6023439 (A) SOURCE CODE: UR/0135/66/000/007/0024/0026

AUTHOR: Tkachev, V. N. (Candidate of technical sciences); Aldyrev, D. A. (Engineer)

ORG: NIITM, Rostov-on-the-Don (NIITM)

TITLE: Induction surfacing of thin-walled metal objects with wear-resistant alloys

SOURCE: Svarochnoye proizvodstvo, no. 7, 1966, 24-26

TOPIC TAGS: induction hardening, wear resistant alloy, conveying equipment

ABSTRACT: The results of testing induction-surfaced "trough" of scraper conveyers are presented. Due to thermal effect on the surface, induction surfacing causes considerable warpage in the sheet metal. By clamping the work as shown in figure 1, the maximum warpage is reduced 25 times compared with an unclamped sheet. Two methods of placing inductors were used: from the side of the deposited layer, and from the other side. The second method is more efficient in that the inductor is closer to the workpiece. With a metal thickness of 3 mm and a frequency of 70 kilocycle, the current penetration is 2.6 mm. About 86.5% of the induced energy is turned into heat in this area. The other 13.5% of the energy input is released in the 0.4 mm of the sheet. Hence, it follows that the heat input is evenly spread throughout the entire thickness. In order to deposit 4 areas 140 x 30 mm, a special inductor was designed. It has an F100 ferritic magnet for increasing its efficiency. The F100 has a permeability coefficient of 100

Card 1/2

UDC: 621.791.927.7:621.3.023:669.018.25

L 04549-66

ACC NR: AP6023439

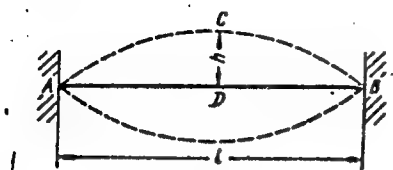


Fig. 1. Scheme of deformation of the coated zone.

and a maximum working temperature of 350°C. The depositing inductor is supplied from the LZ-107 high-frequency source (rating 100 kw, frequency 70 kilocycle, deposition area 140 × 25 mm, layer thickness 0.75 ± 0.25 mm). Deposition regime: time--25-30 sec, power consumption--1.1-1.2 (mw/hr), anode voltage--11 kv, contour voltage--4.5-6 kv, anode current--16-13 ka, grid current--2.8-3a. Under the above conditions, the sheet metal did not warp. However, due to internal stresses, some warpage took place during cooling. Therefore, the sheet must be water cooled before unclamping. This process is called "thermal fixing" and according to the micrographic tests it produced neither micro- nor macro-cracks. The Rockwell hardness of the surface was 48-52. The coated troughs are 1.8 times more wear-resistant compared with the uncoated troughs. Orig. art. has: 5 figures.

SUB CODE: 11,13/ SUBM DATE: none

Card 2/2 JS

TKACHEV, V.N.; RADCHENKO, A.T.; FISHTEYN, B.M.

Characteristics of the white layer formation on cog wheels.
Metalloved. i term.obr.met. no.1:47-49 Ja '65.

(MIRA 18:3)

1. Rostovskiy nauchno-issledovatel'skiy institut tekhnologii
mashinostroyeniya.

TKACHEV, V.N., kand. tekhn. nauk; FISHTEYN, B.M., inzh.

Some factors determining the structure and wear resistance
of hard facing deposited as sormite. Avtom. svar. 17 no.11:57-64
N '64 (MIRA 18:1)

1. Rostovskiy-na-Donu nauchno-issledovatel'skiy institut tekhnologii mashinostroyeniya.

TKACHEV, V.N.

Methods of studying the abrasion of metals. Zav. lab. 29
no.6:758-760 '63. (MIRA 16z6)

(Metals--Testing) (Abrasion)

TKACHEV, V.N., kand.tekhn.nauk; KAZINTSEV, N.V., inzh.

High-frequency hard facing with sormite of self-dressing
plowshares. Svar.proizv. no.1:14-16 Ja '63. (MIRA 16:2)

1. Nauchno-issledovatel'skiy institut tekhnologii mashino-
stroyeniya Rostovskogo soveta narodnogo khozyaystva.
(Hard facing) (Plows)

S/277/63/000/001/002/017
A052/A126

AUTHOR: Tkachev, V. N.

TITLE: On the mechanism of corrosion fatigue of metals

PERIODICAL: Referativnyy zhurnal, otdel'nyy vypusk, 48. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin, no. 1, 1963, 4, abstract 1.48.19 ("Sb. rabot N.-i. in-ta tekhnol. mashinostr. Sovnarkhoz Rostovsk. ekon. adm. r-na", no. 1, 1960, 47 - 54)

TEXT: Two theories dealing with the mechanism of corrosion fatigue are compared and the process of crack formation in the elements of low-pressure boilers from the water side is studied. The character of corrosion-fatigue damages on the metal of locomotive-type boilers shows that under conditions in question the corrosion factor plays the primary part in the origination of corrosion-fatigue damages.

[Abstracter's note: Complete translation]

Card 1/1

S/277/63/000/001/011/017
A052/A126

AUTHOR: Tkachev, V. N.

TITLE: On some properties of alloys

PERIODICAL: Referativnyy zhurnal, otdel'nyy vypusk, 48. Mashinostroitel'nyye materialy, konstruksii i raschet detaley mashin, no. 1, 1963, 19, abstract 1.48.149 ("Sb. rabot N.-1. in-ta tekhnol. mashinostr. Sovnarkhoz Rostovsk. ekon. adm. r-na", no. 1, 1960, 78 - 82)

TEXT: Mechanical properties (σ_s and σ_b at compression, the run-in capacity) were investigated and wear and corrosion-resistance tests were carried out of Zn-Al-alloy (up to 15% Al) also with Mg, Mn and Si additions, which were introduced in the form of master alloys. The tests have shown that 0.05% Mg raise corrosion-resistance of the alloy, an addition of more than 0.1% Mg reduces sharply the ductility and makes run-in of the alloy to the shaft neck worse. An addition of 0.4% Si reduces the ductility and causes shaft neck scoring at $p = 20 \text{ kg/mm}^2$. Among the alloys in question, $\Pi AMu 10-0,5$ (TsAMts 10-0.5) has optimum properties and can be used as a bearing material.
[Abstracter's note: Complete translation]

Card 1/1

S/277/63/000/001/002/017
A052/A126

AUTHOR: Tkachev, V. N.

TITLE: On the mechanism of corrosion fatigue of metals

PERIODICAL: Referativnyy zhurnal, otdel'nyy vypusk, 48. Mashinostroitel'nyye materialy, konstruktsii i raschet detaley mashin, no. 1, 1963, 4, abstract 1.48.19 ("Sb. rabot N.-i. in-ta tekhnol. mashinostr. Sovnarkhoz Rostovsk. ekon. adm. r-na", no. 1, 1960, 47 - 54)

TEXT: Two theories dealing with the mechanism of corrosion fatigue are compared and the process of crack formation in the elements of low-pressure boilers from the water side is studied. The character of corrosion-fatigue damages on the metal of locomotive-type boilers shows that under conditions in question the corrosion factor plays the primary part in the origination of corrosion-fatigue damages.

[Abstracter's note: Complete translation]

Card 1/1

TKACHEV, V.N., kand.tekhn.nauk

New method for strengthening cutting parts of soil-cultivating machines. Mashinostroenie no.4:96-99 J1-Ag '62. (MIRA 15:9)

1. Nauchno-issledovatel'skiy institut tekhnologii mashinostroyeniya, Rostov-na-Donu.

(Cultivators)

TKACHEV, V. P.

AUTHOR: Tkachev, V.P., Engineer

98-7-13/20

TITLE: Improved Arrangement in Switching to Water or Cement in the Mixing Section of Concrete Plants (Uluchsheniye skhemy pereklyucheniya vody i sostavlyayushchikh betona v smesitel'nom otdelenii betonnoy zavoda)

PERIODICAL: Gidrotekhnicheskoye Stroitel'stvo, 1957, No 7, p 44, (USSR)

ABSTRACT: Very often with concrete mixing plants with a frontal arrangement of the mixing machines (two per section), only one mixing machine was able to operate. This deficiency was due mainly to the fact, that the water faucet was hand-operated. The builders of the "Irtyshtsesstroy" joined the supply of cement with that of water, installing a two-cylinder device, driven by compressed air, which operated the 2 valves of the water pipe and the 2-way chute of the cement hopper simultaneously, or alternately, thus giving both mixing machines efficient and foolproof service. This article contains 1 figure.

AVAILABLE: Library of Congress

Card 1/1

VOLYNSKIY, Z.M., prof.; TKACHEV, V.P., kand.med.nauk

Use of radioactive iodine in coronary circulation disorders; clinical
and experimental investigations. Terp.arkh. 31 no.9:12-20 S '59.
(MIRA 12:11)

1. Iz kafedry gosptal'noy terapii No.2 Voenno-meditsinskoy ordena
Lenina akademii imeni S.M. Kirova (nach. - prof. Z.M. Volynskiy).
(CORONARY DISEASE ther.)
(IODINE radioactive)

MARTIROSOV, K.S.; TKACHEV, V.P.

Examination of the functional state of the liver with the
aid of radioactive Rose Bengal. Med.rad. 8 no.2:3-5 F'63
(MIRA 16:11)

1. Iz kafedry voyenno-morskoy i gosptal'noy terapii
(nachal'nik - prof. Z.M.Volynskiy) Voyenno-meditsinskoy
ordena Lenina akademii imeni S.M.Kirova.

*

SAGUNOV, V.G., kand. geologo-mineralogicheskikh nauk; TKACHEV, V.R.

Studying the waste products of mining and metallurgical
enterprises of Kazakhstan as compound trace element fertilizers.
Vest. AN Kazakh. SSR 19 no.12:23-29 D '63. (MIRA 17:12)

TKACHEV, V.P., inzhener.

Improving systems of regulating water and concrete components in
the mixing section of concrete plants. Gidr. stroi. 26 no.7:44
Jl '57. (MLRA 10:8)

(Concrete plants)

SAGUNOV, V.G. / TKACHEV, V.R.

Phosphorite-bearing coal deposits in central and northern Kazakhs-
tan. Izv. AN Kazakh. SSR. Ser. geol. no.1:55-63 '60.
(MIRA 13:8)

(Kazakhstan--Phosphorites)

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CIA-RDP86-00513R001755920016-5"

to lever; 3 - lever hinged to the
rod and strut section.

Card 3 - 3

TKACHEV, V.V.; LEYCHENKO, I.Ya.; OGANESOV, V.N.; ONISHCHENKO, I.S.;
NELIDOV, V.A.; SERKACHEV, O.V.; BOGIN, A.M.

Using separator mills in making cements of various specific
surface areas. TSement 26 no.2:13-20 Mr-Ap '60.
(MIRA 13:6)

(Cement) (Milling machinery)

TKACHEV, V.V.
BARON, L.I., doktor tekhn.nauk; TKACHEV, V.V., gornyy inzhener

Field testing of the simplified dry dust collector. Gig. i san. 22
no.11:86-88 N '57. (MIRA 11:1)

1. Iz Komissii pir Akademii nauk SSSR po bor'be s silikozom i
Nauchno-issledovatel'skogo instituta "Vniasbesttsement"
(SILICOSIS, prev. & control
in mining, prev. with dry dust collector (Rus))

TKACHEV, V.V., mladshiy nauchnyy sotrudnik

Effect of the depth of tillage on physical properties of soil
and crop yields. Izv.TSKhA no.3:109-126 '59. (MIRA 12:10)
(Tillage)

TKACHIV, V.V., inzh.; SHIMECHEK, Ya. [Simecek, J.]

Evaluation of methods for dust control during the boring of
upraises in soft rock. Bor'ba s sil. 6:120-183 '64
(MIRA 18:2)

1. Institut gigiyeny truda i professional'nykh zabolevaniy
AMN SSSR i Institut gigiyeny truda i professional'nykh za-
bolevaniy, Praga, Chekhoslovakiya.

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